Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Particle Size Control of Polyethylene Glycol Coated Fe Nanoparticles[1] B. SRINIVASAN, M.J. BONDER, Y. ZHANG, D. GALLO, G.C. HADJIPANAYIS, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716 — Recent interest in Fe nanoparticles with high magnetization is driven by their potential use in biomedical applications such as targeted drug delivery, MRI contrast enhancement and hyperthermia treatment of cancer. This study looks at the use of a polyethylene glycol (PEG) solution to mediate the particle size and therefore control the coercivity of the resulting nanoparticles. Iron nanoparticles were synthesized using an aqueous sodium borohydride reduction of ferrous chloride by a simultaneous introduction of reagents in a Y- junction. The resulting product was collected in a vessel containing a 15 mg/ml carboxyl terminated polyethylene glycol (cPEG) in ethyl alcohol solution located under the Y junction. By varying the length of tubing below the Y junction, the particle size was varied from 5-25 nm. X-ray diffraction data indicates the presence of either amorphous Fe-B or crystalline alpha Fe, depending on the molar ratio of reagents. Magnetic measurements indicate the particles are ferromagnetic with values of coercivity ranging from 200-500 Oe and a saturation magnetization in range of 70-110 emu/g. The XRD shows that the particles are not affected by the polymer coating.

[1]Work Supported by NSF- DMR PHYS312129

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Date submitted: 22 Dec 2005 Electronic form version 1.4